

[0069] [Step SA09] The display data generation unit **230** creates display data in which the keyword in the character string of the circuit comment of the ladder program is replaced by the information on the operation situation of the CNC corresponding to the keyword, and outputs the created display data to the display unit **240**.

[0070] [Step SA10] The display data generation unit **230** creates display data including the character string of the circuit comment of the ladder program as it is, and outputs the created display data to the display unit **240**.

[0071] [Step SA11] Manipulation instruction by the manipulation unit **250** is accepted, and the processing is performed in accordance with the manipulation instruction.

[0072] [Step SA12] It is determined whether or not manipulation instruction of ending operation of the ladder diagram monitor display function is made. When ending operation of the ladder diagram monitor display function is instructed, the current processing is ended, and otherwise, the process proceeds to step SA13.

[0073] [Step SA13] It is determined whether or not manipulation instruction of switching the ladder program to be displayed is made. When the manipulation instruction of switching is made, the process returns to step SA01, and otherwise, the process returns to step SA07.

[0074] When a ladder circuit interlinking with operation of the CNC, such as control of a numerically controlled axis with a ladder program, is debugged and diagnosed with the ladder diagram monitoring device of the present invention configured as above, the states of signals used in the ladder circuit, and the operation situations of the CNC in connection with the ladder circuit are displayed side by side on the ladder diagram monitor display. Thereby, since the operation situations of the ladder circuit and the CNC can be simultaneously checked, the ladder program can be efficiently debugged and diagnosed.

[0075] Moreover, since in the circuit comments in which annotations explaining the processing content of the ladder circuit are displayed, the operation situations of the CNC which are in connection with the ladder circuit explained by the circuit comments can be displayed, the processing of the relevant ladder circuit can be more understandably explained.

[0076] Furthermore, since the information of the CNC displayed in the vicinity can be configured for each ladder circuit, the information of the CNC in accordance with the ladder circuit displayed on the monitor display screen is automatically displayed without calling for or designating the information of the CNC in connection with the ladder circuit individually.

[0077] Notably, while the embodiment of the present invention has been described, the present invention is not limited only to the example of the aforementioned embodiment but can be embodied in various aspects based on proper modifications.

[0078] For example, while in the aforementioned embodiment, an example is presented in which the CNC **1** and the ladder diagram monitoring device **2** are separately configured and the ladder diagram monitoring device **2** is connected to the CNC **1** to display the operation situations of the ladder program executed on the CNC **1** and the operation situations of the CNC on a monitor, the ladder diagram monitoring device **2** and the CNC **1** may be integrally configured. In this case, among the functional means included in the ladder diagram monitoring device **2**, the

display unit **240** corresponds to the display controller **15** and the display unit **22** included in the CNC **1**, and the manipulation unit **250** corresponds to the MDI controller **16** and the MDI unit **23**. The other functional means is realized by the CPU **10** that executes programs for the ladder diagram monitor display function which are stored in the ROM **11** or the like.

[0079] Moreover, while in the aforementioned embodiment, the display data is generated by replacing the keywords embedded in the circuit comments by the information on the operation situations of the CNC, modes of display are not limited to this. For example, the information on the operation situations of the CNC corresponding to the keywords may be displayed in the vicinities of the keywords in the circuit comments.

[0080] Furthermore, while in the aforementioned embodiment, the configuration is taken in which the CNC information table **310** is provided in the ladder diagram monitoring device **2** and the information on the operation situations of the CNC corresponding to the keywords is specified to be acquired from the CNC **1**, there may be taken a configuration in which a configuration corresponding to the CNC information table **310** is provided on the numerical controller side, inquiry is made to the CNC **1** using the keywords, and thereby, the information on the corresponding operation situations of the CNC can be acquired. In this way, a configuration corresponding to the CNC information table **310** is not needed to be provided on the ladder diagram monitoring device **2** side.

1. A ladder diagram monitoring device which displays an operation situation of a ladder program on a monitor and is capable of describing, in the ladder program, comment information added to a circuit executed on a programmable controller built in a numerical controller,

Wherein the comment information added to the circuit is provided with a region for displaying information on an operation situation of the numerical controller, and the ladder diagram monitoring device comprises:

- a ladder program operation situation acquisition unit that acquires information on the operation situation of the ladder program;
- a CNC operation situation acquisition unit that acquires the information on the operation situation of the numerical controller;
- a display data generation unit that generates display data, which reflects the operation situation of the ladder program and is for displaying the operation situation of the numerical controller, in the region in the comment information added to the circuit, based on the ladder program, the information on the operation situation of the ladder program, and the information on the operation situation of the numerical controller; and
- a display unit that displays the display data.

2. The ladder diagram monitoring device according to claim 1, wherein

the region in the comment information added to the circuit presents a keyword corresponding to the information on the operation situation of the numerical controller, and

the display data generation unit is configured to generate the display data by replacing the keyword in the comment information added to the circuit by the infor-